DIRECT TESTIMONY OF

JAMES W. NEELY, P.E.

ON BEHALF OF

DOMINION ENERGY SOUTH CAROLINA, INC.

DOCKET NO. 2022-2-E

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND OCCUPATION.

A. My name is James W. Neely. My business address is 400 Otarre Parkway, Cayce, South Carolina 29033. I am employed by Dominion Energy Services, Inc. as an Energy Market Consultant for Dominion Energy South Carolina, Inc. ("DESC" or the "Company").

Q. STATE BRIEFLY YOUR EDUCATION, BACKGROUND, AND EXPERIENCE.

A. I received a Bachelor of Science degree from Mars Hill University in 1979. I graduated from Clemson University in 1984 with a Bachelor of Science degree in electrical engineering. I received a Master of Science degree in management from Southern Wesleyan University in 2002. I was employed by South Carolina Electric & Gas as a design engineer at V.C. Summer Station from 1992 to 1997. In 1997, I went to work in the SCE&G Resource Planning department as a Resource Planning Engineer. In 2013, I was promoted to Senior Resource Planning Engineer and, after the Dominion Energy merger, my title changed to Energy Market Consultant.

Q. HAVE YOU PREVIOUSLY TESTIFIED AS A WITNESS BEFORE THE PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA (THE "COMMISSION")?

A. Yes, I have testified in prior proceedings before the Commission.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

The purpose of my testimony is to discuss the 11 components of value for distributed energy resource ("DER") avoided cost contained in the net energy metering ("NEM") methodology approved by the Commission in Order No. 2015-194, issued in Docket No. 2014-246-E, and in Order No. 2021-569, issued in Docket No. 2019-182-E.

NEM BACKGROUND

Q. WHAT ARE DISTRIBUTED ENERGY RESOURCES?

A. South Carolina Code Section 58-39-120(C) defines DER as follows: "[D]emand- and supply-side resources that can be deployed throughout the system of an electrical utility to meet the energy and reliability needs of the customers served by that system, including, but not limited to, renewable energy facilities, managed loads (including electric vehicle charging), energy storage, and other measures necessary to incorporate renewable generation resources, including load management and ancillary services, such as reserves, voltage control, and reactive power, and black start capabilities."

Q. WHAT IS NET ENERGY METERING?

A. South Carolina Code Section 58-40-10(E) defines NEM as follows: "'Net energy metering' means using metering equipment sufficient to measure the difference between the electrical energy supplied to a customer-generator by an electrical utility and the electrical energy supplied by the customer-generator to the electricity provider over the applicable billing period."

Q. HOW IS NEM EMPLOYED ON THE COMPANY'S ELECTRIC SYSTEM?

A. For customers using solar or other DER on the system, NEM measures generation on both sides of the meter, i.e., it measures both the electricity provided by the Company to the customer as well as the electricity provided by the customer to the Company if the customer's DER generates more electricity than the customer uses. All NEM customers currently on the DESC system have installed photovoltaic ("PV") solar generation.

Q. WHAT ARE AVOIDED COSTS?

A. South Carolina Code Section 58-39-120(B) defines "avoided costs" as "payments for purchases of electricity made according to an electrical utility's most recently approved or established avoided cost rates in this State or rates negotiated pursuant to [the Public Utility Regulatory Policies Act ("PURPA")], in the year the costs are incurred, for purchases of electricity from qualifying facilities pursuant to Section 210 of [PURPA]…."

PURPA and its implementing regulations require electric utilities, including DESC, to purchase electric energy from qualifying facilities ("QF") at the utilities' avoided costs. However, state public utility commissions, such as the Commission, determine the method for calculating avoided costs, which are updated on a periodic basis. PURPA and the related regulations define "avoided costs" as "the incremental costs to an electric utility of electric energy or capacity or both which, but for the purchase from the qualifying facility or qualifying facilities, such utility would generate itself or purchase from another source." 18 C.F.R. § 292.101(b)(6).

The Federal Energy Regulatory Commission ("FERC") further recognizes that avoided costs include two components: "energy" and "capacity." Specifically, "[e]nergy costs are the variable costs associated with the production of electric energy (kilowatt-hours). They represent the cost of fuel, and some operating and maintenance expenses. Capacity costs are the costs associated with providing the capability to deliver energy; they consist primarily of the capital costs of facilities." *Small Power Production and Cogeneration Facilities; Regulations Implementing Section 210 of the Public Utility Regulatory Policies Act of 1978*, Order No. 69, 45 Fed. Reg. 12,214, 12,216 (Feb. 25, 1980); *see also Qualifying Facility Rates and Requirements Implementation Issues Under the Public Utility Regulatory Policies Act of 1978*, Order No. 872-A, 173 FERC ¶ 61158 (Nov. 19, 2020) ("The [FERC] has not changed these definitions; they still apply to both 'short-run' and long-run avoided costs.").

Q. WHAT APPROACH DOES DESC TAKE TO CALCULATE THE ENERGY AND CAPACITY COMPONENTS OF AVOIDED COSTS?

A. As approved by the Commission in Orders No. 2016-297, 2018-322(A), and 2019-847, DESC uses a Difference in Revenue Requirements methodology to calculate both the energy component and the capacity component of its avoided costs. This approach follows directly from PURPA's definition of avoided costs in that it involves calculating the revenue requirements between a base case and a change case. The base case is defined by DESC's existing and future fleet of generators and the hourly load profile to be served by these generators, as well as the solar facilities with which DESC has executed a power purchase agreement. The change case is the same as the base case except that, pursuant to Order No. 2020-244, a zero-cost purchase transaction is modeled at 100MW around the clock. This is the same avoided energy cost calculation method used for the PR-1 and PR – Standard Offer as presented by DESC in Dockets 2019-184-E, 2021-88-E and endorsed by the Commission in those proceedings. For the avoided energy cost determination, a system production cost model called PLEXOS, which models the least-cost commitment and dispatch of generating units to serve load hour-by-hour, makes two runs and estimates the production costs and benefits that result from the purchase transaction. The base and change cases are identical except for the zero-cost purchase transaction. The avoided energy cost is the difference between the base case costs and the change case costs.

COMPONENTS OF VALUE FOR NET ENERGY METERING DISTRIBUTED ENERGY RESOURCES

Q. WHAT ARE THE COMPONENTS OF VALUE FOR NEM DISTRIBUTED ENERGY RESOURCES?

A. In Order No. 2015-194, the Commission approved the 11 components of value for NEM Distributed Energy Resources:

Net Energy Metering Methodology

1. +/- Avoided Energy
2. +/- Energy Losses/Line Losses
3. +/- Avoided Capacity
4. +/- Ancillary Services
5. +/- T&D Capacity
6. +/- Avoided Criteria Pollutants
7. +/- Avoided CO_2 Emission Cost
8. +/- Fuel Hedge
9. +/- Utility Integration & Interconnection Costs
10. +/- Utility Administration Costs
11. +/- Environmental Costs

= Total Value of NEM Distributed Energy Resources

As directed by the Commission in Order No. 2020-244 issued in Docket No. 2019-184-E, the Company submitted the current components of value of NEM Distributed Energy Resources to the Commission in the 2021 Fuel hearing, Docket 2021-2-E. The 11 components of value for NEM Distributed Energy Resources were also affirmed in Order 2021-569 issued in Docket 2019-182-E except the long run values are changed to require to reflect a 20 year avoided energy and capacity which will be seen in Table 2. Table 1, below, shows these current components of value.

Table 1
Total Value of NEM Distributed Energy Resources ($/kWh)
Currently in Effect

	Current Period ($/kWh)	10-Year Levelized ($/kWh)	Components
1	$0.02877	$0.03163	Avoided Energy Costs
2	$0	$0.00379	Avoided Capacity Costs
3	$0	$0	Ancillary Services
4	$0	$0	T & D Capacity
5	$0.0000011	$0.0000011	Avoided Criteria Pollutants
6	$0	$0	Avoided CO_2 Emission Cost
7	$0	$0	Fuel Hedge
8	($0.00096)	($0.00096)	Utility Integration & Interconnection Costs
9	$0	$0	Utility Administration Costs
10	$0.00126	$0.00120	Environmental Costs
11	$0.02907	$0.03566	Subtotal
12	$0.00237	$0.00291	Line Losses @ 0.9245
13	$0.03145	$0.03857	**Total Value of NEM Distributed Energy Resources**

Q. HAS DESC UPDATED THESE COMPONENTS OF VALUE?

A. Yes. Table 2 shows the updated components of value for NEM Distributed Energy Resources. Two columns of numbers are shown: one for the current period values and one for the value over the twenty-year planning period. The difference between these two columns of numbers represents the future benefits of DER that are subject to recovery by the Company pursuant to Commission Order No. 2015-194 and South Carolina Code Section 58-40-20.

Table 2
Total Value of NEM Distributed Energy Resources ($/kWh)
Proposed Values

	Current Period ($/kWh)	20-Year Levelized ($/kWh)	Components
1	$0.03024	$0.03878	Avoided Energy Costs
2	$0.00000	$0.00034	Avoided Capacity Costs
3	$0.00000	$0.00000	Ancillary Services
4	$0.00000	$0.001838	T & D Capacity
5	$0.0000004	$0.0000002	Avoided Criteria Pollutants
6	$0.00000	$0.00000	Avoided CO_2 Emission Cost
7	$0.00000	$0.00000	Fuel Hedge
8	($0.00180)	($0.00180)	Utility Integration & Interconnection Costs
9	$0.00000	$0.00000	Utility Administration Costs
10	$0.00015	$0.00011	Environmental Costs
11	$0.02860	$0.03928	Subtotal
12	$0.00234	$0.003208	Line Losses @ 0.9245
13	$0.03093	$0.04248	**Total Value of NEM Distributed Energy Resources**

Q. PLEASE EXPLAIN THE COMPONENT OF VALUE FOR AVOIDED ENERGY COSTS SHOWN ON LINE NO. 1 OF TABLE 2.

A. The component of value for avoided energy costs are based on the PURPA avoided cost values previously discussed with one adjustment. The avoided energy costs are adjusted to remove the cost of criteria pollutants and environmental costs, which are then reflected in the components shown on Lines 5 and 10, i.e., Avoided Criteria Pollutants and Environmental Costs. The current period value is for year

2022 while the 20 year levelized values are from years 2022-2041. The twenty year period is required by Commission Order No. 2021-569.

Q. CAN YOU EXPLAIN THE COMPONENT OF VALUE FOR AVOIDED CAPACITY COSTS SHOWN ON LINE NO. 2 OF TABLE 2?

A Pursuant to Commission Directive in Docket 2021-88-E, the component of value for avoided capacity is set to $0.00034/Kwh for the 20 year planning horizon. There are no capacity needs until 2028 therefor the Current Period avoided Capacity is zero. This calculation is based on the DRR method and assumes a resource plan based on 1294 MW of coal plant retirements in 2028 and the addition of 105 MW aeroderivative turbines to meet a winter reserve margin of 21%. The 105 MW aeroderivative is the unit defined in EIA AEO 2021 with capital costs of $1169/Kw and Fixed Operating and maintenance costs of $16.38/Kw-year. The EIA AEO capital costs includes $5.7 million of electrical and gas interconnection costs, therefore no additional interconnection costs were added. The 20 year capacity value is 87.73/KW-yr which is converted to $/Kwh and applied to a NEM energy profile which has an annual capacity contribution of 3.423% (87.73/8760*3.423%=$0.00034/Kwh.) The twenty year period is required by Commission Order No. 2021-569. This is the value shown on Line No. 2 of Table 2.

Per Commission Order 2021-569, “it is reasonable to estimate the hourly usage profile of a customer-generator using historic usage profiles and estimating

the net hourly usage profile of these customers by applying the aggregate generation profile for that corresponding period recorded from all customer-generators with production meters owned and controlled by the electrical utility." The 3.423% was obtained in this way, by using the historic usage profiles to determine the annual capacity contribution from NEM customer-generators.

Q. CAN YOU EXPLAIN THE COMPONENT OF VALUE FOR ANCILLARY SERVICES SHOWN ON LINE NO. 3 OF TABLE 2?

A. Ancillary services refer to the need to balance the load and generation on the system and include operating reserves, both spinning and non-spinning; frequency regulation; and voltage control. DESC expects that the cost of providing these ancillary services will increase with the addition of large amounts of solar energy. This will result in a reduction (negative value) to avoided cost.

Customer-generators do not currently provide ancillary services for compensation from electrical utilities. As commercially available technology expands the feasibility of customer DERs providing ancillary services (positive value) and technical standards throughout the industry emerge, DESC will investigate how they could create programs to leverage DER to provide ancillary services to populate this value category. Currently DESC has assigned a value of zero to ancillary services but will address non-zero costs under the overlapping concept of integration cost on Line No. 8 of Table 2.

Q. IF YOU WOULD, CAN YOU PLEASE EXPLAIN THE COMPONENT OF CURRENT YEAR VALUE FOR TRANSMISSION AND DISTRIBUTION CAPACITY SHOWN ON COLUMN 1 OF LINE NO. 4 OF TABLE 2?

A. For the current period, DESC's NEM distributed resources do not avoid transmission or distribution capacity, and, therefore, the value of this component is zero.

Q. COULD YOU ALSO PLEASE EXPLAIN THE COMPONENT OF 20-YEAR LEVELIZED VALUE FOR TRANSMISSION AND DISTRIBUTION CAPACITY SHOWN ON COLUMN 2 OF LINE NO. 4 OF TABLE 2?

A. For the 20 year avoided transmission and distribution ("T&D") costs, the value is $0.001838/kWh. In making this calculation, the company identified the average annual T&D costs in the 5 year budget that could be avoided. Next the company determined the average annual 20 year load growth. The average annual T&D costs are $1,300,000 for transmission and $3,128,200 for distribution. The 20 year average load growth is 29,708 kW. The calculation requires application of an economic carrying charge applicable to distribution costs and transmission costs. The economic carrying charge applied to those costs adjusts the annual fixed charges for inflation. The fixed carrying charges and the economic carrying charges are equivalent in the sense that they have the same present worth but the annual charges in the economic stream are paid for (or accounted for) with future-year dollars i.e. inflated dollars.

Applying an economic carrying charge for distribution costs of 10.91% yields $11.48823/kW in avoided distribution costs ($3,128,200/ 29,708kW*10.91%=$11.48823/kW). Applying an economic carrying charge of 10.53% to transmission costs yields $4.6095/kW avoided transmission costs ($1,300,000/29,708kW*10.53%=$4.6095/kW). Combining the transmission and distribution avoided cost produces a 20 Year avoided T&D cost of $16.0977/kW-yr. When converted to $/kWh this value is $0.001838/kWh.

Even though the company is applying a T&D avoided cost it should be noted that on the distribution system, DESC's engineers must design the system for circumstances that will stress the circuits. In particular, since solar output is intermittent during the day and non-existent at night, engineers must also plan for times when the DER are not supplying power. The distribution line must carry the load both when the DER are generating and when they are not because of weather-related factors or because the DER are offline.

Q. PLEASE EXPLAIN THE COMPANY'S PLAN TO CONSIDER TRANSMISSION AND DISTRIBUTION CAPACITY ASSOCIATED WITH CUSTOMER-GENERATOR FACILITIES.

A. The Commission has provide the following direction in Commission Order 2021-569. Avoided transmission and distribution may have a nonzero value and electrical utilities should make greater effort to quantify a value using a methodology that accounts for relative availability of and granularity of data about

the distribution and transmission system. While transmission and distribution costs are location specific, the Commission acknowledges that it would take some analytical sophistication and a more transparent T&D planning process to assign values with that level of precision and granularity in time and location. Accordingly, it is reasonable to provide electrical utilities flexibility at this time to employ a methodology that reflects the current state of available data.

Electrical utilities, however, are directed to provide the Commission, within 90 days of this order, a narrative of how they plan to improve these data capabilities over time to improve the insight into the transmission and distribution systems and to modernize the planning of transmission and distribution assets to take into account the ability of DERs to avoid or defer traditional, utility-owned T&D capital investments.

In response to Order No. 2021-569 in Docket No. 2021-182-E, DESC filed its plan for improving its ability to provide T&D avoided costs on November 17, 2021.

Q. PLEASE EXPLAIN THE COMPONENT OF VALUE FOR AVOIDED CRITERIA POLLUTANTS SHOWN ON LINE NO. 5 OF TABLE 2?

A. DESC associates a positive avoided cost value to criteria pollutants NO_x and SO_2. The avoided cost of these pollutants typically is included in the Company's avoided energy costs, but these costs have been separated out in this proceeding for reporting purposes.

Q. PLEASE EXPLAIN THE COMPONENT OF VALUE FOR AVOIDED CO_2 POLLUTANTS SHOWN ON LINE NO. 6 OF TABLE 2.

A. Pursuant to Commission Order No. 2015-194, the component of value for avoided CO_2 is set at zero until state or federal laws or regulations result in an avoidable cost on utility systems for these emissions. Currently, there are no state or federal laws or regulations restricting the emission of CO_2 pollutants and, therefore, the value for CO_2 pollutants is zero.

Q. PLEASE EXPLAIN THE COMPONENT OF VALUE FOR FUEL HEDGE SHOWN ON LINE NO. 7 OF TABLE 2.

A. DESC does not hedge fuels for electric generation. Therefore, the cost and therefore the value for fuel hedging is zero.

Q. PLEASE EXPLAIN THE COMPONENT OF VALUE FOR UTILITY INTEGRATION & INTERCONNECTION COSTS SHOWN ON LINE NO. 8 OF TABLE 2.

A. Pursuant to Commission Directive, issued in Docket No. 2021-88-E, the component of value for the integration charge is set to $1.80/MWH ($0.0018/Kwh). This integration charge will be deducted from the avoided cost. Per Commission Order 2021-569 issued in Docket 2019-182-E the integration costs are only applied to exported power for customer-sited DER. The Commission also requires that integration costs for DER should focus more on any distribution-system related

impacts. The integration cost of $0.0018/Kwh will be used integrate DER since the drivers of the integration costs are the same for DER and utility scale projects.

Q. PLEASE EXPLAIN THE COMPONENT OF VALUE FOR UTILITY ADMINISTRATION COSTS SHOWN ON LINE NO. 9 OF TABLE 2?

A. At present, the administration costs of NEM Distributed Energy Resources are being collected through a DER rider being added to the fuel clause. Therefore, the value of this component for purposes of the NEM Distributed Energy Resources methodology calculation is zero.

Q. PLEASE EXPLAIN THE COMPONENT OF VALUE FOR ENVIRONMENTAL COSTS SHOWN ON LINE NO. 10 OF TABLE 2?

A. The component of environmental costs refers to any appropriate environmentally related costs that were not already included in other net metering methodology components. DESC associates a positive avoided cost value to represent the cost of certain environmental materials used in the generation of energy, such as lime, limestone, and ammonia. The avoided cost of these materials typically is included in the Company's avoided energy costs, but these costs have been separated out in this proceeding for reporting purposes.

Q. PLEASE EXPLAIN THE COMPONENT OF VALUE FOR ENERGY LOSSES/LINE LOSSES SHOWN ON LINE NO. 12 OF TABLE 2.

A. When a NEM Distributed Energy Resource serves a customer's load behind their meter or when it puts power onto the distribution system, DESC avoids having

to generate that specific amount of energy. The Company also avoids the energy required to bring the power to the customer's meter or the distribution system, i.e., the line losses associated with delivering power across the system. The loss factor used for these NEM values represents the cumulative marginal line losses at a residential customer's meter.

Q. PLEASE EXPLAIN THE COMPANY'S PLAN TO CONSIDER LINE LOSSES ASSOCIATED WITH CUSTOMER-GENERATOR FACILITIES.

In Commission Order No. 2021-569, the Commission modifies the existing methodology to require that electrical utilities determine the marginal line losses associated with customer-generator facilities. If marginal line loss data does not exist for an electrical utility, the Commission directs the development of a plan within 90-days of this Order to acquire this capability.

DESC proposes to continue to apply its current approach for deriving losses for its distribution system, which is based on a rigorous analysis of metered data that reconciles with measured data. DESC proposes to provide increased granularity by applying its current approach to representative circuit types. The approach recognizes that marginal losses vary significantly based on factors such as voltage level, line length and load distribution. DESC proposes to apply an industry-accepted statistical approach to identify representative circuits and derive marginal losses for each. DESC proposes to calculate losses by load level and time of day via the creation "loss curves" for the representative feeders. The loss curves are based

on the calculation of losses at increasing feeder loads and create a curve fit based on a subset of loss factors. These loss curves can be used to interpolate or extrapolate losses based on hourly loads.

Similar to distribution, DESC proposes to continue to apply its current approach to determine transmission losses, where marginal losses are equal to average losses. DESC expects the accuracy of data at individual substations will improve with the availability of AMI data. However, DESC does not propose to derive transmission losses for specific lines or locations. The rationale for derivation of system-wide marginal losses is due to the fact DESC's transmission is configured as a network and the level of analysis required to predict losses at each location (e.g., transmission mode) is not warranted or necessary. Output from customer-generators will typically cause losses to decline across the entire network. Further, transmission system losses vary due to changes in loads, line outages, generation dispatch, interchange, and loop flows—each of which increases the complexity of attempting to derive losses at individual nodes or locations.

DESC proposes a two-phase approach. The first phase will include development of a process to capture transmission network losses obtained from DESC's Energy Management System (EMS) under a range of load and generation dispatch conditions. Similar to distribution, "loss curves" of the transmission network will be created based on the calculation of system losses at increasing loads. The resulting curve fit can then be used to interpolate or extrapolate losses by time

of day based on system loads. The second phase, which will be performed following completion of the first phase, will assess the feasibility of deriving marginal losses on a seasonal or time of day basis.

Q. HAS THE GENERAL ASSEMBLY ENACTED LEGISLATION THAT WILL PHASE OUT THE NEM PROGRAM?

A. Yes. In South Carolina Code Section 58-40-20(B), the General Assembly required electric utilities to make NEM available to customer-generators who apply before June 1, 2021, and allows the customer-generators to continue NEM "as provided for in Commission Order No. 2015-194 until May 31, 2029."

Q. WHAT PROGRAM HAS THE GENERAL ASSEMBLY PROVIDED FOR CUSTOMER-GENERATORS WHO APPLY AFTER MAY 31, 2021?

A. In Section 58-40-20(F), the General Assembly required development of a "solar choice metering tariff" for customer-generators who apply after May 31, 2021. DESC's solar choice metering tariff is the subject in Docket No. 2020-229-E.

Q. EVEN THOUGH THE GENERAL ASSEMBLY HAS ENACTED LEGISLATION PROVIDING FOR TERMINATION OF THE NEM PROGRAM AND ESTABLISHMENT OF THE SOLAR CHOICE PROGRAM, IS IT NECESSARY TO CONSIDER THE COSTS OF THE NEM PROGRAM IN THIS PROCEEDING?

A. Yes. Because the Company's current NEM program will continue until May 31, 2029, for customer-generators applying on or before May 31, 2021, it is

necessary to consider the costs of the NEM program as part of the Company's fuel cost proceedings during the pendency of that program.

CONCLUSION

Q. WHAT IS DESC ASKING THE COMMISSION TO DO IN THIS PROCEEDING?

A. DESC respectfully requests that the Commission approve the calculation of the total value of NEM Distributed Energy Resources as set forth in my testimony.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.